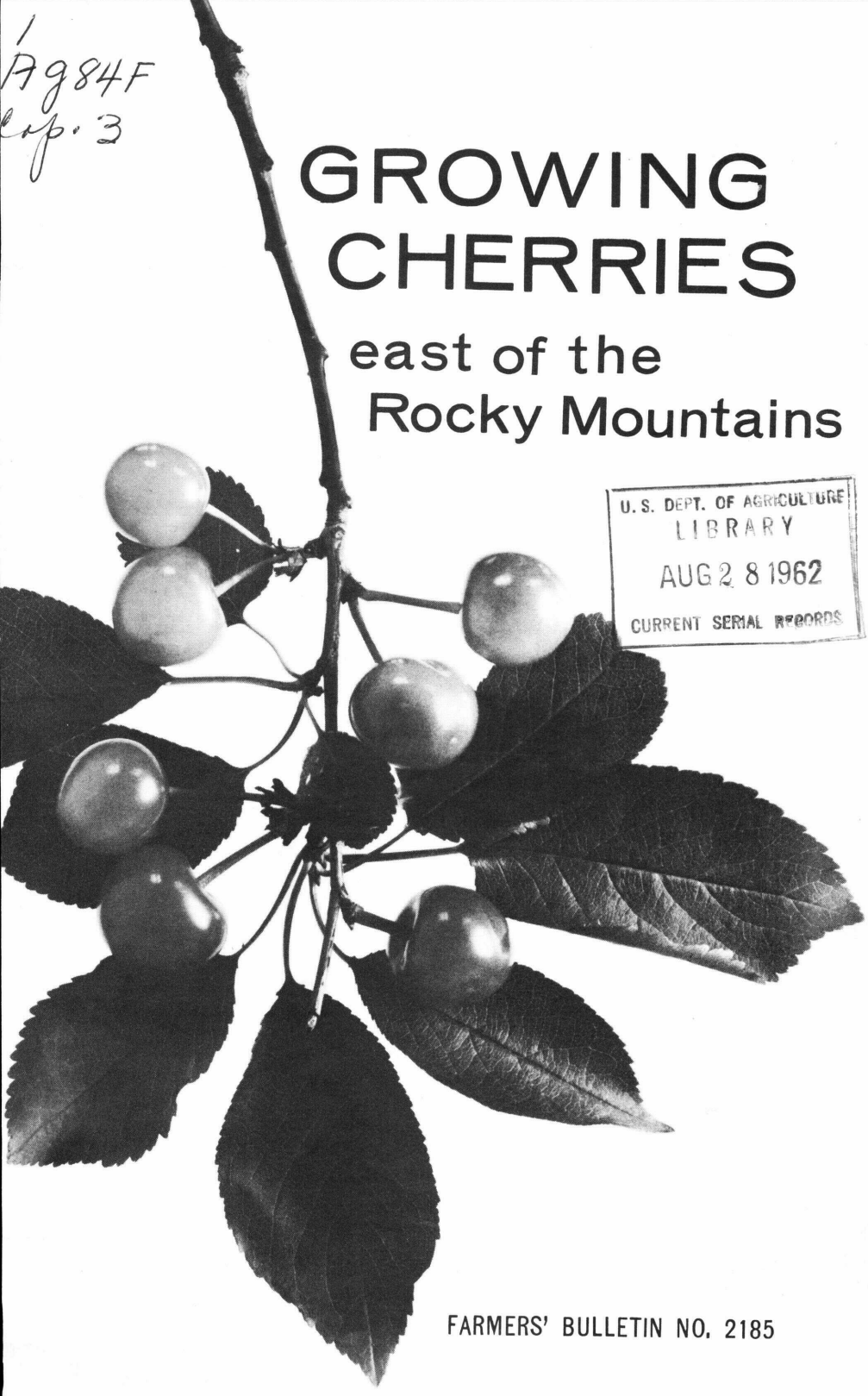
GROWING CHERRIES

east of the Rocky Mountains



FARMERS' BULLETIN NO. 2185

U.S. DEPARTMENT OF AGRICULTURE

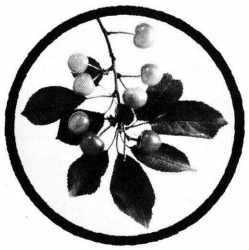
CONTENTS

Growth Through Agricultural Progress

This bulletin supersedes Farmers' Bulletin 776 of the same title.

Washington, D.C. Issued July 1962

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington 25, D.C. - Price 15 cents



GROWING CHERRIES

east of the Rocky Mountains

By Leon Havis,[1] Leader, Stone Fruit Investigations,
Crops Research Division, Agricultural Research Service

DISTRIBUTION OF TREES

Approximately 10,200,000 cherry trees of bearing age grow throughout the United States. They are distributed in every State, but almost three-fourths of them are in four Eastern States: Michigan has about 4,500,000; New York, 1,200,000; Wisconsin, 1,012,000; and Pennsylvania, 690,000.

Sour cherries predominate: In all States there are about 7,600,000 sour-cherry trees, and 2,600,000 sweet-cherry [2] trees.

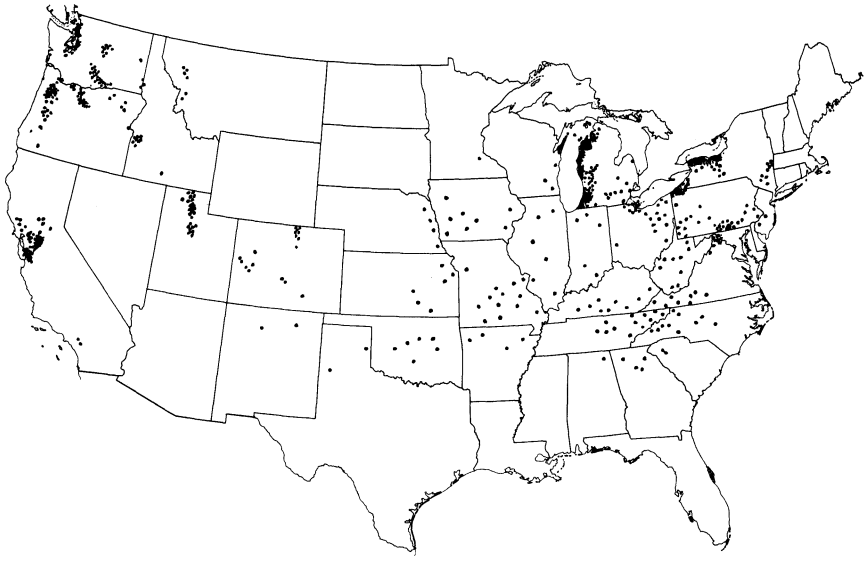
Climate, usually temperature, is the most important influence in the geographic distribution of cherry trees. Generally, the trees do not thrive where summers are long and hot, or where winter temperatures are high for short periods. Chiefly because of this, they are grown only to a slight extent in the South; there they thrive best at higher altitudes.

Winter injury to trunks of cherry trees is serious in some central and southern parts of the country (fig. 2). Sour-cherry trees are usually less hardy than apple varieties such as McIntosh and Northern Spy, commonly grown in the northern commercial apple-producing areas. Sometimes the trunks and crotches of the cherry trees are injured by low winter temperatures in the northern cherry-growing areas (fig. 3). Also, sour-cherry blossoms are very susceptible to injury by low temperatures in the spring; often they are injured more than the blossoms of peaches in the same areas.

The most important commercial sour-cherry orchards are located in the Hudson River Valley, in western New York, in western Michigan, in northern Ohio, in the Arkansas River Valley in Colorado, in Door County, Wis., and in southern Pennsylvania. Large quantities of

[1] The author received very helpful suggestions from M. M. Hoffman, Pomology Department, Cornell University, in preparing this publication. Cornell University furnished the photographs for figures 3, 4, 5, 9, 10, 14, 20, and 23.

[2] Including the Dukes, which are hybrids between the sweet and sour types.



BN-13491-X

Figure 1.—Map of United States, showing distribution of cherry trees in 1960. Most of those growing along the Pacific coast are sweet cherries. Note the wide distribution of trees and the concentration of plantings near the Great Lakes.

cherries are produced in other States and sections, but usually the individual orchards are small and do not represent important community interests. Sour cherries often produce well in the central and southern Great Plains region, where more tender fruits usually fail.

The leading varieties of sweet cherries are less hardy than the best-known sour sorts. Their endurance of cold is similar to that of the peach. Sweet varieties are susceptible not only to wood and bud injury during winter but also to frost damage to blossoms in early spring.

The most important sweet-cherry producing sections are in the Pacific Coast States, where the sour cherry is not grown extensively. East of the Rocky Mountains, commercial production of sweet cherries is confined largely to the Hudson River Valley, to western New York, and to western Michigan. In the last two sections, the climate is considerably moderated by the Great Lakes. Sweet-cherry trees are widely distributed in a large part of the country, but their number is relatively small except in the sections mentioned.

SELECTING ORCHARD SITES

By "site" is meant the area of land actually occupied by the trees. Selecting a site for a cherry orchard requires the same general considerations that apply in selecting a site for an apple or peach orchard. The most important considerations are soil and local climatic conditions.

Soil

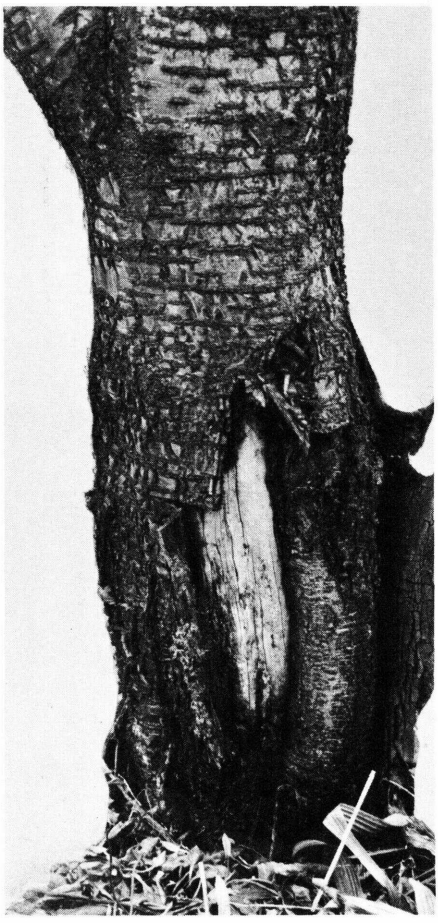
Cherry trees thrive on a wide range of soil types, provided the soils are well drained. Perhaps no fruit tree is more sensitive to the ill effects of a poorly drained soil than the cherry (figs. 4 and 5). In many important cherry-growing sections the prevailing soils are rather light—sandy loams and other light, sandy soils—and usually are underlain by a somewhat clay-type subsoil. Such soils occur in districts bordering the Great Lakes, where the most important commercial cherry areas east of the Rocky Mountains are located. However, the industry doubtless has developed in these districts because of climatic conditions that are induced by large bodies of water, rather than because of the existence there of any particular soil type.

Many of the better orchards in western New York are on Dunkirk clay loam, which is fairly heavy but well drained. Because the heavier, clay types often are extremely retentive of moisture or are insufficiently drained for good results, the comparatively light soils are preferred for cherries.

For success with sweet cherries, the lighter, warmer types of soil usually are regarded as essential. Soils that are droughty, and that dry out excessively, are unsatisfactory for either type of cherry. Moderately productive soils give better results than those having either extreme in fertility.

Temperature

Local temperature conditions should be given consideration. Cherries blossom comparatively early; usually the sweet varieties blossom earlier than the sour. Sites that are subject to spring frosts during the blossoming period



G-125

Figure 2.—Trunk of Montmorency cherry, showing winter injury. This type of injury is often caused by rapid changes in temperature. The injury to this tree occurred several years before the photograph was made, and considerable healing had taken place, as indicated by new bark along the right side of the wound.

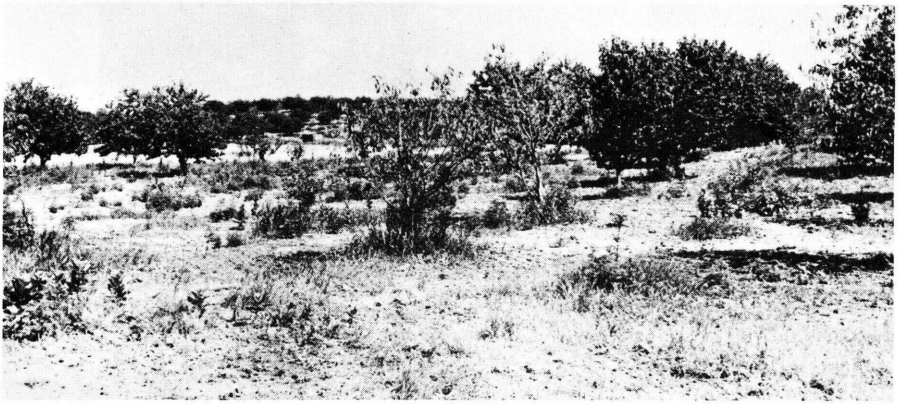
should be avoided. Because cold air settles to lower levels, orchards occupying sites somewhat higher than the surrounding areas are usually less liable to frost injury than are those having comparatively low elevation. Also, the soil on higher levels is likely to be better drained.

PROPAGATION AND CHOICE OF STOCKS

The details of propagating cherry trees are of little direct importance

BN-13693

Figure 3.—Sweet-cherry tree, showing winter injury to crotch and trunk. This tree grew in New York, and the injury occurred after the late growing season that preceded a freeze in early December.



DN-1971

Figure 4.—Young sweet-cherry trees (foreground and center) that grew poorly because they were planted on poorly drained soil. Trees on higher ground and better drained soil (right and left) made good growth.

to the average grower, who usually finds it to his advantage to buy trees from a reputable nurseryman. Trees are propagated by budding on seedling stocks in the nursery row; 1- or 2-year-old trees are commonly sold for planting. Since virus diseases that reduce fruit production can be carried in the buds, it is essential that nurserymen use budwood only from trees that are free of such diseases.

Two kinds of rootstock are in general use—the mahaleb and the mazzard.

The mahaleb is used much more extensively than the mazzard. Usually it is satisfactory for the sour varieties, and is more productive when these varieties are grown in good soil. The mahaleb stock is also commonly used for sweet cherries, and tends to produce a smaller, more spreading tree; but there is evidence that the sweet sorts often are more vigorous and longer lived when grown on mazzard stock.

Trees on mahaleb rootstock seem more spreading than those on mazzard in the early bearing years, probably because those on mahaleb usually grow more slowly and bear fruit when they are younger. Mazzard rootstock is more desirable for poor soils.

Some growers prefer the mazzard as a stock for sour as well as sweet cherries. Other growers, however, maintain that trees propagated on mahaleb stock are preferable because they come into bearing earlier and produce heavier crops while young.

SELECTING AND HANDLING NURSERY-GROWN TREES

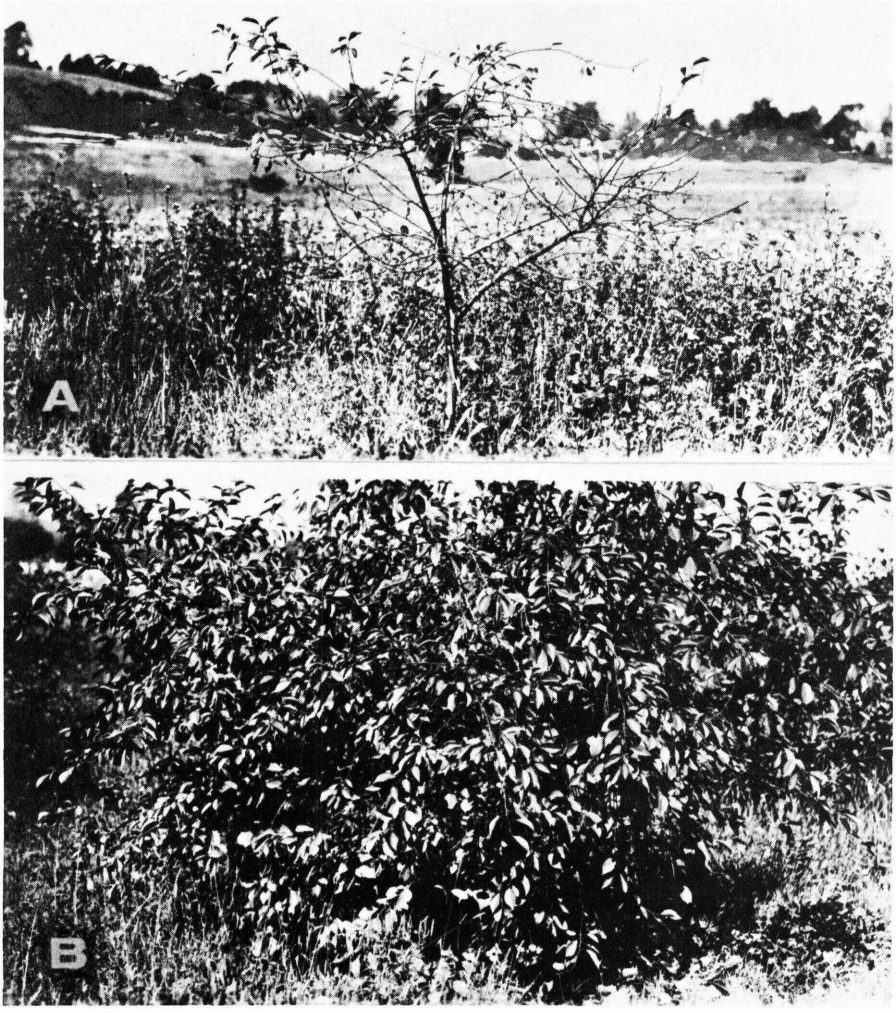
For sour cherries, 1- or 2-year-old nursery trees may be used. Medium-sized trees, 4 to 5 feet high and $\frac{9}{16}$ to $\frac{11}{16}$ of an inch in diam-

eter, seem preferable, but smaller trees are often satisfactory (fig. 6).

For sweet varieties, many growers are selecting 1-year-old trees. These trees should be medium sized—4 to 5 feet high, and $\frac{9}{16}$ to $\frac{11}{16}$ of an inch in diameter.

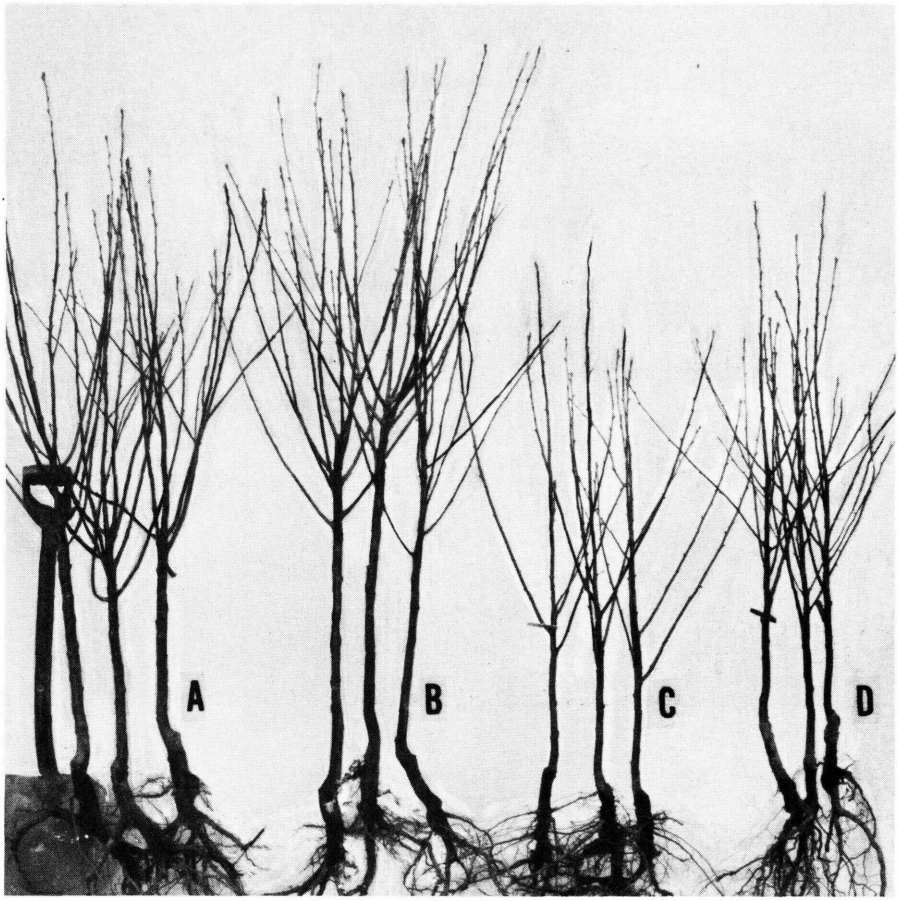
The trees should be unpacked immediately after delivery, and every precaution should be taken to prevent the roots from becoming dry. The trees should be heeled in (fig. 7), unless their number is so limited that immediate planting is possible and the time for doing it is at hand.

A thoroughly drained place where the soil is mellow and deep should be used for heeling in the trees. A trench is made suffi-



BN-13486-X-, BN13486-X

Figure 5.—English Morello trees 6 years old, showing effect of soil drainage: A, On poorly drained soil; B, on well-drained soil. These trees were within 2 rods of each other, and the camera was at the same distance from each.

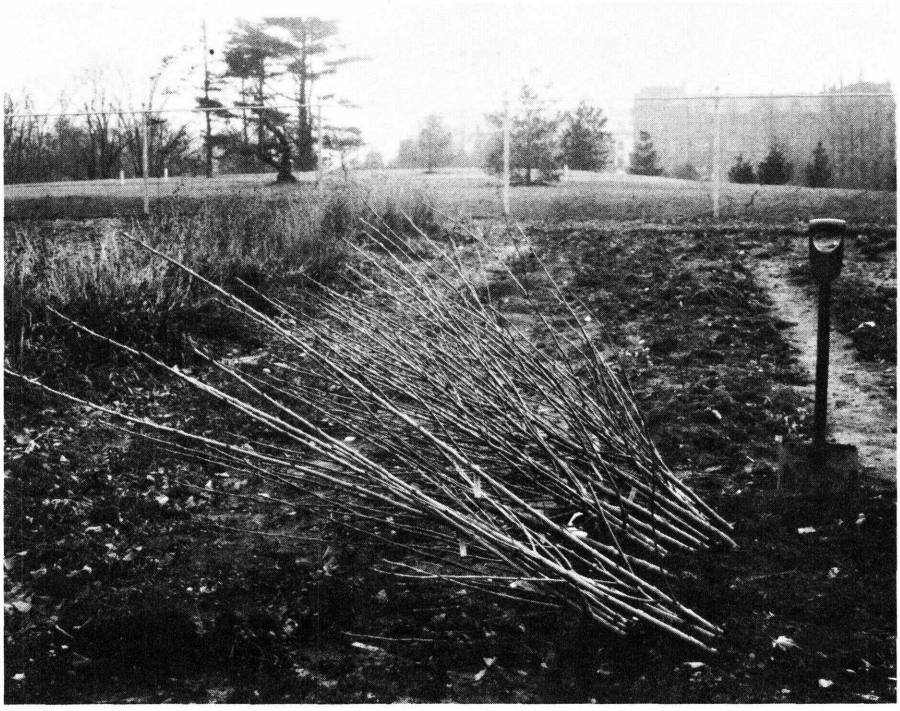


P-18296

Figure 6.—Sour-cherry trees representing different grades of nursery stocks, as follows: A, 2-year-old Montmorency on mazzard stock, ¾ inch up in diameter, 5 to 7 feet high; B, same as A except on mahaleb stock; C, 1-year-old Montmorency on mazzard stock, ⅝ to 11/16 inch in diameter, 3 to 4 feet high; D, 1-year-old Montmorency on mahaleb stock, ⅝ to 11/16 inch in diameter, 3 to 4 feet high.

ciently wide and deep to receive the roots, and the trees are laid in at an angle. Moist soil is then worked among the roots to fill all the spaces between them. If a large number of trees are to be heeled in, they usually are placed in closely adjacent rows. When this is done, the roots in one row may be covered with the soil that is removed in opening the adjacent trench. Trees that are tied in bundles when received must be separated before they are heeled in. If this is not done, it is difficult to work the soil among the roots sufficiently to prevent them from drying.

It is best that cherry trees be planted as soon as possible after they are dug in the nursery. Much loss of young orchard trees could



P-18299

Figure 7.—Cherry trees heeled in.

be prevented if this were done. If possible, the trees should be obtained and planted in the fall.

PLANTING THE TREES

In areas where winters are extremely severe, spring planting is advisable. In the middle latitudes and where winters are comparatively mild, fall planting usually is preferable. There is an increasing tendency to plant in fall in States as far north as New York, Ohio, and Michigan.

It is very important to keep the trees in a completely dormant condition until they are set out. The reason for this is that the buds of cherry trees swell and start growth very early; if this begins to any considerable extent before the trees are planted, a high percentage of failures is likely to result.

Soil for cherry planting should be prepared according to the method found necessary for other trees and crops of a similar nature. This will vary with the location and soil type.

Cherry trees are planted various distances apart, the distance depending on the topography of the land, fertility of the soil, varietal characteristics of the trees, and preferences of individual growers. Some of the smaller sorts, such as English Morello, are sometimes planted 16 to 18 feet apart each way. For most sour varieties, 20

feet apart is generally accepted as satisfactory. On soils where trees grow well, a greater distance between them is desirable; this is particularly true for strong-growing varieties like Montmorency.

The bad effect of too close planting is suggested in figure 8, which shows a Montmorency orchard about 21 years old in which the trees are 14 feet apart each way. The branches interlock, so that spraying is difficult; they are long, slender and upright, making it difficult to harvest the crop.

On well-drained, fertile soil, Montmorency trees may become too close even when spaced more than 20 feet apart, and some of the trees may need to be removed for best orchard operation. The trees shown in figure 9 are obviously too close.

Probably 25 feet apart each way is the minimum distance advisable for sweet cherries; many growers prefer 28 to 32 feet each way.

The square system is generally used in planting cherry trees; however, a contour system should be considered on sites where there is danger of erosion. Contour planting means planting each row of trees at the same level or on a contoured line with a slight grade along which water can move slowly. Sometimes a system of terraces is desirable. In contour planting, there should be a minimum distance of about 18 feet between rows of

P-16477

Figure 8.—Montmorency cherry orchard about 21 years old, New York. The trees are 14 feet apart each way and tall, and the branches are long and slender, as a result of the trees being planted too close together.

sour-cherry trees, and about 22 feet between rows of sweet-cherry trees.

Soil and moisture conservation are important for the best production. Usually the extra time required to plan and lay out a good conservation system is well spent.

The details of planting do not differ from those usually followed with apples, peaches, or other fruit trees commonly planted in sections where cherries are grown.

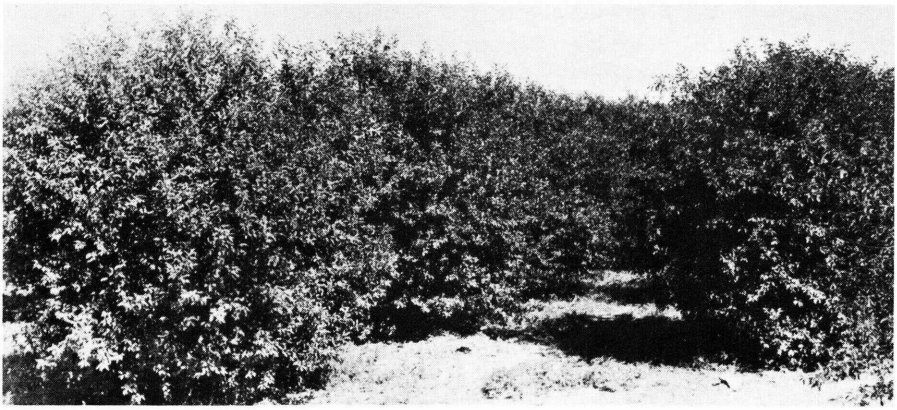
When a tree is being prepared for planting, all mutilated or injured parts of the roots should be removed; long, slender roots, if they occur, should be cut to match the length of the main roots.

Every precaution should be taken to prevent the roots from becoming dry. The tree roots will be injured if they are unduly exposed to cold or to drying out during the period between trimming and planting. Many poor stands of cherry trees have resulted from allowing the roots to be exposed just before planting.

In filling the hole after a tree has been put into position and alined, only pulverized topsoil should be used around the roots. Care should be taken to work the soil in closely; moving the tree up and down very slightly as the hole is being filled will help settle the soil among the roots. As the filling progresses, the soil should be firmly tamped about the roots; when the operation is completed, the hole should be

BN-13429-X

Figure 9.—Twelve-year-old Montmorency trees. The permanent trees are planted 24 by 24 feet on a square system, and there is a semipermanent tree in the center of the square. These trees on mazzard stocks and in good soil are too close together.



BN-13430

Figure 10.—Well-spaced trees in a Montmorency cherry orchard. The semipermanent trees were removed when 12 years old. (Compare with fig. 9, which shows the same orchard before the semipermanent trees were removed.)

filled to the surface. If water is available, the hole should be filled with water when it is about two-thirds filled with soil then completely filled with soil several hours later.

TILLAGE, AND MAINTENANCE OF SOIL FERTILITY

Commercial cherry orchards usually are given clean tillage with a disk harrow during the early summer, or until about the middle of July. There is a great difference in the clean-tillage practices of different growers. Some growers cultivate their orchards once a week during the active growing period of the trees; the modern trend, however, is toward three or four cultivations during the entire season.

An early-summer cover crop should not be grown in the cherry orchard. The rapid growing of fruits and shoots requires large amounts of moisture and soil nutrients. Cover crops in the early summer, when most growth takes place, may compete seriously with the trees.

If there is danger of soil and water loss from erosion, it is necessary to have a more continuous cover crop. Usually a cover crop is seeded at the last cultivation, at about the time the fruit is harvested; it is disked down early the following spring. Some successful cherry growers allow weeds to grow as a cover crop during the late summer and fall. However, a planned cover-crop system is often necessary to prevent erosion on sloping locations, even where contour planting or terracing is not essential.

Other advantages of cover crops are increasing the porosity of heavy soils, increasing the available soil moisture, and retaining the soil nutrients in sandy soils. The type of cover crop used, and the method of handling it, vary in different districts and sometimes even on different farms in the same locality.

In many sections, one of the best cover crops for cherries is rye, sown in late summer at the rate of about 1½ bushels per acre. It should be disked down well before it matures in the spring, to prevent competition with the trees. Some growers prefer to use a late-summer crop that does not survive the winter, such as oats, millet, or buckwheat.

Sometimes cherry orchards can be maintained satisfactorily in sod, if adequate nitrogen fertilizer is applied. Under a sod system, however, the trees may suffer from lack of moisture unless the soil is deep. A mulch of straw, hay, or some such material around the trees is valuable. If sod is available, it should be used with the mulch; sod is especially desirable on relatively shallow soil. Trees grow better under early-summer cultivation, and a continuous sod should be considered only when necessary to prevent erosion, where bluegrass is native, it is one of the best sods; in other districts the native grasses, lespedeza, and other legumes may be used.

Application of a complete fertilizer, such as 10–10–10, at the rate of about 250 pounds per acre when the crop is planted, is often valuable in obtaining a vigorous cover crop.

The fertilization procedure for cherries is similar to that necessary for other orchard trees; it varies somewhat with the soil. Cherries usually respond well to nitrogenous fertilizers such as sodium nitrate, ammonium sulfate, and ammonium nitrate. Because of differences in the soil, no definite amount to apply can be stated. As a general guide, ½ pound of sodium nitrate for each year of the tree's age may be used. Thus, a 6-year-old tree would be given 3 pounds of sodium nitrate, or 1½ pounds of ammonium nitrate, since the latter contains twice as much actual nitrogen as the sodium nitrate. Usually the application of any other element is not necessary, but cherry trees in a few sections have responded to potassium.

The fertilizer should be spread uniformly under and around the trees to just beyond the drop of the branches. Nitrogen fertilizer may be applied either in fall or early spring. Usually it is necessary to apply more fertilizer to trees grown in sod than to those that are clean cultivated. For example, trees in bluegrass sod require about three times the amount necessary for cultivated trees.

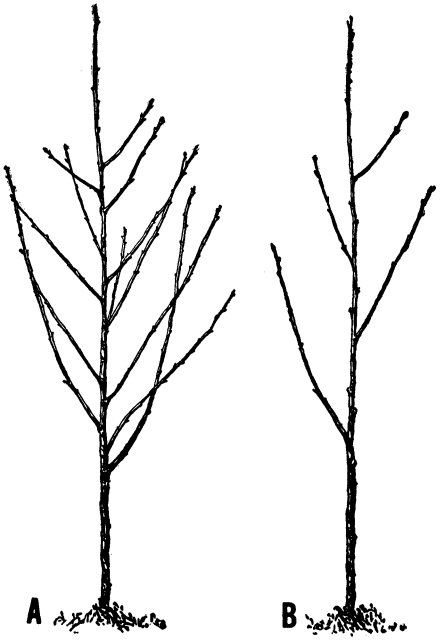
An orchard may endure an interplanted crop without appreciable ill effect, but the crop will be of no benefit to the trees unless the orchard is given better tillage because of it. Beans, peas, tomatoes, and other vegetables of like cultural requirements are the least objectionable. Crops that require late-summer cultivation should not be used in the Northern States, where winter injury of cherry is common because of immaturity of the wood.

The planting of an annual crop in an orchard is a system of double cropping in which the more important crop is the cherry. The tops require only a small part of space aboveground, but the roots

occupy a large part of the soil much earlier in their lives than is commonly supposed.

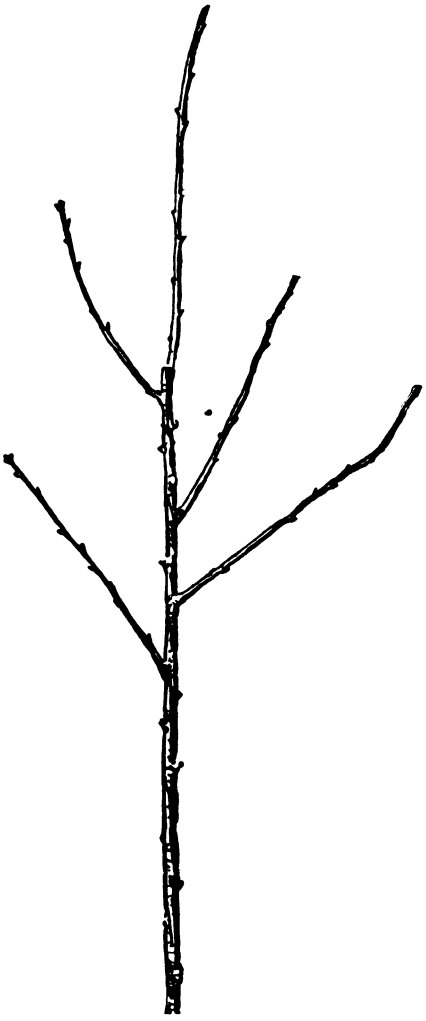
PRUNING

Trees of the sour-cherry varieties tend to spread in growth; those of the sweet varieties are more upright; and trees of the Duke varieties are intermediate in type. These different growth habits should be considered in pruning and training the trees. The modified-leader system is preferable for all types of cherries; but the sweet varieties, and to less degree the Duke varieties, tend naturally toward a central-leader tree, and it is best not to try to change them much.



G–127, G–12

Figure 11.—One-year-old Montmorency cherry tree, about 3 feet high, showing method of pruning at time of planting: A, Before pruning; B, after pruning.



G–128

Figure 12.—Montmorency tree grown 2 years in the nursery and about 4 feet high, pruned properly for setting in the field. Note that the original leader was cut back after 1 year in the nursery but that the lateral branch selected as a leader was not cut back.

Sour-Cherry Trees

Both well-grown 1-year-old and 2-year-old sour-cherry trees should be branched when received from the nursery. About four branches

should be selected for main, or scaffold limbs of the tree (figs. 11 and 12). The lowest scaffold limb should start 14 to 16 inches from the ground; the others should be well spaced around the trunk up and down so that none is directly over a lower one. Where possible, the scaffolds, or main branches, should be at least 4 to 6 inches apart up and down the trunk. If all are allowed to develop from the same height, a weak tree is likely to result (figs. 13 and 14).

For these scaffold limbs, only branches with the widest angles should be retained. The more vigorous branches should be selected, and should be cut back to about the length of weaker ones, so that all may develop to approximately equal length. The main stem, or trunk,

G-129

Figure 13.—Montmorency cherry tree that has no leader, and has all scaffold limbs arising at the same height. The limb at the left is very weak at the crotch and is likely to break and leave a large wound on the trunk.

BN-13487-X

Figure 14.—Eight-year-old cherry tree, showing type of scaffold-limb breakage common on cherry trees on which several limbs are allowed to develop at the same height.

is not cut back at planting time; it should be left higher than any of the scaffold branches (figs. 11 and 12).

One year after planting, little pruning should be necessary. At this time, extra scaffold limbs that may have been left at planting can be removed. If some scaffold limbs are more vigorous than others, they may be suppressed by (1) removing some of the lateral branches on the scaffold limb and (2) pruning back the main one to an outward- and upward-branching lateral.

After a tree has been 2 years in the orchard, its leader should be cut back to a strong outward and upward lateral. Then, there should be another selection of two or three scaffold limbs on the upper part of the trunk, so that about six finally remain well distributed along about 3 feet of the trunk.

The pruning during the first 4 or 5 years is mainly to train the young trees so as to obtain maximum strength and productivity. Some pruning will be necessary each year to maintain a balance between the scaffold limbs. If some are allowed to develop more rapidly than others, the leader and the weaker scaffold branches will be choked out (fig. 15). More pruning than necessary, however, will delay bearing and dwarf the tree.

When sour-cherry trees reach mature bearing age they require little pruning except some thinning out of weak branches, especially on the inside of the trees (fig. 16). If this is not done they become

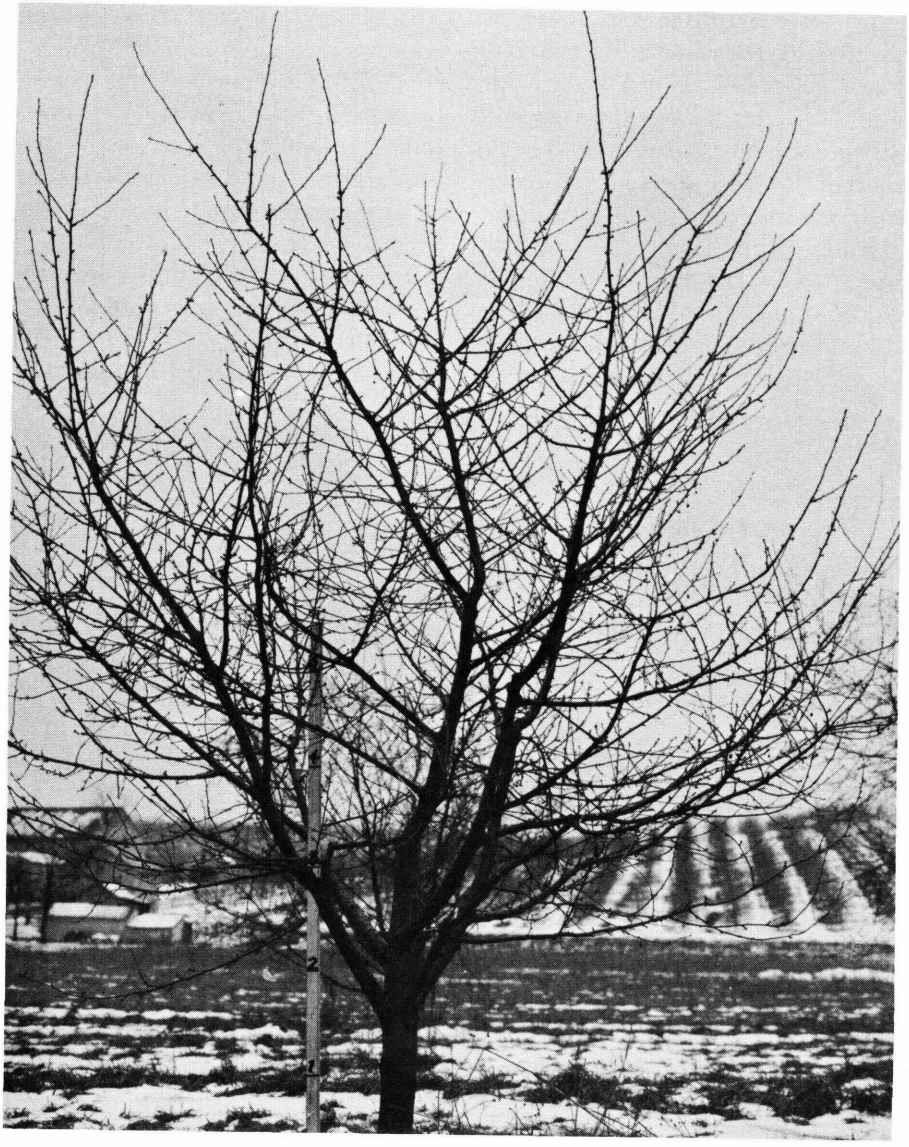
bushy and hard to spray and pick, and they bear many small, unevenly ripening fruits (fig. 18). It is best to head back trees that become too tall. This can be done by heading back the branches. Moderately light pruning accompanied by adequate nitrogen fertilization will help maintain good terminal growth and vigorous spurs.

G-130-P

Figure 15.—Three-year-old Montmorency cherry tree with weak crotch that resulted from allowing the scaffold branches to crowd out the leader.

Sweet-Cherry Trees

A 1-year-old sweet-cherry tree has few or no lateral branches when received from the nursery. If a tree 4 to 5 feet high is used, many growers prefer not to cut back the leader for at least 2 years. If there are branches, they may be selected and spaced around the trunk by much



G-131

Figure 16.—Vigorous Montmorency cherry tree, about 7 years old. It received little pruning after selection of scaffold branches. When the tree was photographed, little was needed except a light thinning out of weak limbs in the center. Note the strong, well-spaced scaffold branches.

the same method described for sour-cherry trees. The branches should be cut back only if necessary to reduce the longest ones to about the same length as the shortest.

The scaffold branches of a 2-year-old sweet-cherry tree usually can be selected at the time it is planted. These branches should have wide angles at their bases and should be spaced 8 to 10 inches above one another. Well-selected branches will be stronger and more resistant to winter injury than poorly formed ones. Only the largest and most vigorous ones should be cut back at all, and they should be cut very little. Many well-formed sweet-cherry trees have no pruning at all from the time they are set until they reach maturity. Some pruning, however, is usually needed to maintain a balance in growth of scaffold branches (fig. 19).

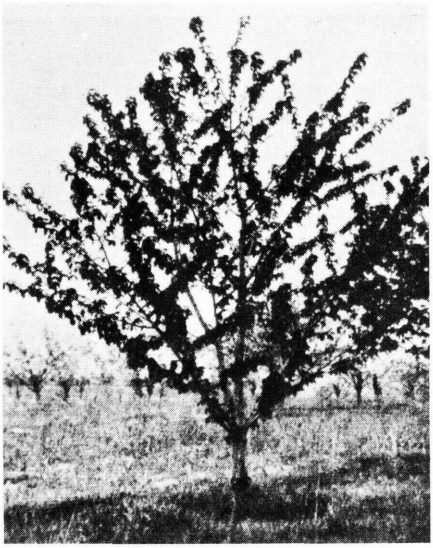
Between the ages of 2 and 7 years, when sweet-cherry trees usually come into bearing, pruning should be very light. The tree is pruned only enough to help balance the scaffold limbs and direct the leader to an outside branch if the leader becomes extremely vigorous.

Dead or broken limbs are removed, and weak ones thinned out (fig. 19). When they become too high for convenience in spraying

G-132

Figure 17.—Twelve-year-old Montmorency cherry tree that had received no pruning for 5 years, and very little pruning before that. When photographed, it was too bushy for uniform ripening of high-quality cherries, for thorough spraying, or for easy harvesting of the fruit. All that it needed, however, was some thinning of weak limbs in the center. Note the strong, well-spaced scaffold branches.

and picking, the most upright limbs may be cut back.



P-16423

Figure 18.—Seven-year-old sweet-cherry tree that received little pruning after being planted. Too many of the lower branches originate at the same height; otherwise the tree is rather well shaped and requires little pruning.

PICKING AND PACKING THE FRUIT

Picking

Cherries are picked with or without their stems, depending on the disposition to be made of them. When they are to be sold on the local fresh-fruit market or shipped to a distant market, the stems must be left on; if they are separated from the stems, juice will ooze from the fruit and cause rapid decay. Sweet varieties, and the sweet-sour hybrids (Dukes), usually are harvested with stems attached. After some experience, pickers can pick cherries with stems attached with little damage to the fruits or spurs on the trees.

When cherries are harvested to be processed for canning or freezing, they are picked without stems. For many years they have been harvested by hand, into pails that usually are tied to the picker's body

BN-13428-X, BN-12431

Figure 19.—A, Six-year-old sweet-cherry tree that never has been pruned except for selection of scaffold branches. Note the well-spaced, wide-angled scaffold branches and the modified leader. B, Same tree after a light thinning-out pruning.

so he can pick with both hands. The fruit is emptied from the pails into lugs, and hauled to the processing plant.

The annual harvesting of approximately 132,000 tons of sour or red tart cherries by hand has been tedious and expensive. Also, the seasonal labor supply is often uncertain, and workers require close supervision.

Mechanical shakers are used in some commercial orchards. The tractor-mounted, hydraulically activated boom-shaker seems to be preferred; it is operated in combination with one of several types of fruit-collecting units. The tractor-mounted boom has a clamp or claw at the end that can be moved about so the clamp can be closed on a scaffold limb. Then the operator hydraulically operates the boom; this causes the limb to shake, and the cherries fall into a canvas frame.

A single mechanical harvester can harvest as much as many hand pickers. These devices are expected

BN-13488-X

Figure 20.—Picking Montmorency cherries without stems for a processing plant. Generally, tin pails or wooden lugs are used as orchard containers.

to come into more general use as improvements are made. They are not yet recommended for harvesting sweet cherries that are to be brined or canned by processors.

Collecting units catch the fruit dropped by the mechanical harvesters. These units usually are made of 6- to 12-ounce canvas and lightweight frames, mounted on wheels or skids. The cherries are emptied from the units into lugs, other containers, or conveyors, as the units are moved from tree to tree down the row.

After being harvested, cherries are handled by one of several methods. From lugs or conveyors, they may be emptied into tanks of cold water, then transported to the processing plant by tractors or trucks. The use of conveyors, when practical, reduces the bruising of cherries as they are moved from the collecting units to the tanks of cold water.

Transportation in tanks of cold water is an advantage whether or not mechanical harvesting is employed. Prompt immersion of the cherries in cold water helps them retain orchard quality, and reduces spoilage and scald. If hand picked, the cherries may be emptied directly from the pails onto a sorting table or conveyor, from which they are carried into the tank of cold water. When they arrive at the processing plant, they are flumed out into a receiving "boot" or tank by the use of additional water.

Packing

A number of methods are used to pack cherries for the fresh-fruit market. Both sweet- and sour-cherry types are often sold for fresh consumption, and are very popular in some markets.

In some orchards, fruit is packed directly in baskets of various sizes. Sometimes the picking pails are emptied onto a sorting table or conveyor from which the cherries are transferred to 1-quart boxes; these are packed into 16- or 24-quart crates for marketing.

Also used are the western lug, holding 15 to 20 pounds, and the 4-quart climax basket.

For highest quality and least spoilage, cherries for fresh consumption must be handled with stems attached and must be kept cool.

DESCRIPTION OF VARIETIES

The number of important cherry varieties grown in Eastern United States are relatively few. Only those most commonly grown are described here.

Montmorency is by far the leading sour variety. Several strains of this variety have been selected and some appear promising, especially to lengthen the season. Montmorency is self-fruitful and does not need to have another variety interplanted with it.

After Montmorency, the next most important sour varieties are English Morello and Early Richmond; they also set good crops without cross-pollination with other varieties.

The Duke cherries are hybrids of sour and sweet cherries, and have some of the characteristics of each. The Dukes vary considerably in their pollination requirements.

P-16690

Figure 21.—Duke cherry trees, 8 years old. Because of the very upright habit of growth and the heavy foliage, individual branches are not visible.

The early-flowering Dukes, such as Brassington and Reine Hortense, should be interplanted with sweet cherries and the late-flowering ones, such as Royal Duke, with sour varieties.

Sweet-cherry varieties are often separated into two groups—the heart, or soft-fleshed, type, such as Seneca or Governor Wood, and the bigarreau, or firm-fleshed, type, such as Windsor or Napoleon. The leading sweet varieties in Eastern States are Windsor, Schmidt, Lambert, and Napoleon; Seneca and Black Tartarian are sometimes desirable because of their earliness.

All sweet varieties are self-unfruitful. It is therefore necessary to plant different varieties near enough to each other to insure transfer of pollen from one variety to another. Also, three common varieties, Bing, Lambert, and Napoleon, will not pollinate each other; some other variety, such as Windsor or Van, must be planted with them.

Sour Varieties

The principal sour-cherry varieties are described in order of their ripening as follows:

Early Richmond.—Early, ripen-

ing 7 to 10 days before Montmorency. Fruits red, small to medium sized, of only fair quality at best. Value doubtful; suggested only because of early ripening; trend is away from it toward early strains of Montmorency.

Montmorency.—Midseason. Fruits bright red, large, of high quality. Trees vigorous and high yielding on good soil. By far the leading sour-cherry variety; the only one grown by many of the most successful growers.

English Morello.—Late, ripening 10 days to 2 weeks after Montmorency. Fruits almost black when fully ripe, medium sized; juice high in sugar, but so high in acid that a sour flavor results. Trees spreading, small (therefore sometimes used in home-garden plantings). Most commonly grown of Morello type, but this type not recommended for general planting because of low yield, limited demand for the fruit, and susceptibility to leaf spot.

Duke Varieties

Duke cherries should be grown only on a small scale unless there is a known demand for fruit of this type. They are neither sweet nor sour, but a blend of both. Most people find them too sour for eating fresh, but many prefer them for canning, freezing, and pie making. The following varieties, listed in the order of their ripening dates, are suggested:

Brassington.—Ripening during sweet-cherry season or soon after. Fruits red, medium sized; quality more like that of sweet cherries than that of sour cherries. Trees often lacking in vigor, breaking easily, and low yielding. Preferred by many for pie making.

Reine Hortense.—Midseason. Fruits light red, large, sweeter than those of Brassington, soft fleshed, juicy, of poor keeping quality. Trees more vigorous and productive than those of Brassington, but also breaking easily. Duke variety that should be used most often.

Royal Duke.—Latest of Duke varieties listed. Fruits dark red, medium sized to large, slightly sweeter than the sour types, attractive. Trees often vigorous, high yielding, resembling the sour varieties, breaking fairly easily. Preferred by some for pie making and eating fresh.

Sweet Varieties

Sweet-cherry varieties are not as dependable as sour ones in most sections. They are more subject to difficulty in establishing the trees; are subject to frost damage, cracking of fruit, brown rot, and loss of fruit from birds damage.

The preferable sweet varieties in the Eastern States are Windsor, Lambert, Schmidt, and Napoleon. Seneca is sometimes planted for a very early variety; Black Tartarian and Victor are planted to ripen slightly later but before the main season. Yellow Spanish is one of the varieties most hardy under low

winter temperatures. Schmidt suffers less from sudden changes in temperature during the winter.

Trees of Schmidt, Black Tartarian, and Napoleon are upright growing and those of Seneca and Windsor are more spreading. Fruits of Windsor are relatively resistant to brown rot; those of Black Tartarian and Seneca are very susceptible to this disease.

The varieties are listed here in the approximate order of their ripening.

Seneca.—Very early. Fruits red, medium sized, of good quality, soft fleshed, juicy. Often used where very early variety is desired, but frequently fruits are largely destroyed by birds.

Black Tartarian.—Early. Fruits purplish black, small to medium sized, of good quality, soft fleshed, juicy. Used principally to lengthen season in home plantings and for local sales.

Victor.—Early. Fruits light colored with pink blush, medium sized to large, firm fleshed. Trees strong and productive.

Van.—Midseason. Fruits dark red, firm fleshed, of high quality. Trees strong and productive; a new variety worth testing, especially for hardiness and resistance to cracking.

Bing.—Midseason. Fruits very dark red to black, large, of high quality, firm fleshed; very attractive when fully ripe, but often cracking open and rotting before fully ripe. Less satisfactory in the East than in the West because of susceptibility to winter injury, cracking, brown rot, and infection of the fruit. Trees usually are only fairly vigorous and productive in the East.

Napoleon (Royal Anne).—Midseason. Fruits light yellow, have pink blush, large, of high quality, firm fleshed, subject to less extensive cracking and rotting than Bing during moist seasons. Trees vigorous, productive, and fairly tolerant of low winter temperatures. Most commonly grown light-colored sweet cherry.

Yellow Spanish. —Midseason. Fruits yellow, have pink blush and attractive ground color, smaller than those of Napoleon, of good quality, firm fleshed. One of the most winterhardy sweet cherries.

Lambert. —Midseason. Fruits dark red, large, firm fleshed, attractive although subject to cracking. Trees vigorous, strong, productive, and fairly hardy. An important Western variety.

Windsor.—Medium late. Fruits dark changing to black when ripe, medium sized to large, of high quality, firm fleshed; smaller and less attractive, but less subject to creaking and rotting than fruits of Bing, Lambert, or Schmidt, therefore often more profitable. Trees spreading, vigorous, productive, and fairly hardy. One of the best varieties for general planting.

Schmidt.—Medium late. Fruits dark red to almost black when ripe, large, of high quality, firm fleshed, very attractive although sometimes injured by cracking, but less so than Bing or Lambert. Trees very vig-

orous, apparently relatively hardy when low temperatures follow warm periods in winter, but relatively late in coming to full bearing.

DISEASES

Virus Diseases [3]

Several virus diseases affect cherries in north-central and northeastern parts of the United States.

Ring spot

The virus disease that most commonly attacks cherry trees is known as ring spot. On sour-cherry trees, this disease is evident only during the initial stages of infection, which usually last 1 to 2 years. After this, infected trees are virus carriers that show no symptoms of the disease other than varying degrees of retarded growth. During the first stages of infection, the trees become retarded in foliation and thin in appearance. Many leaves have indistinct rings of dead tissue, and some leaves become "shotholed" and tattered.

On sweet-cherry trees, ring spot causes discolored and dead ring and shotholed patterns on the leaves, which may become tattered. Symptoms are more severe during the initial stages of the disease; usually they recur annually, and are more pronounced on leaves formed early in the season.

[3] Prepared by L. C. Cochran, plant pathologist, Crops Research Division, Agricultural Research Service.

Yellows

The disease known as yellows is causing increasing damage to sour-cherries; about one-third of all trees in old orchards are affected. The first symptom is a green and yellow mottling of older leaves. This is followed by periodic waves of partial defoliation, starting 3 to 4 weeks after petal fall.

When trees have been affected by yellows for several years they develop abnormally large leaves and few spurs; they bear small crops of large-sized fruit. Eventually, affected trees become thin, fail to make normal growth, and become marginal producers. Symptoms are most pronounced in the better producing areas that have cool climates, such as those bordering the Great Lakes; symptoms may not even be apparent in warmer areas of the midwest.

Certified yellows-free nursery stock is available from many nurseries; the grower should make sure he obtains such stock to start his orchard. Also, he should not start a new orchard adjacent to an old one.

X-disease

X disease affects both sweet- and sour-cherry trees. Affected trees have sparse foliage, are light green, and fail to mature their fruits. At normal maturity time, fruits remain small; sour cherries remain pink, and sweet cherries become light red instead of dark.

X-disease virus spreads from

diseased chokecherries to other fruit trees. It can be controlled by removing the diseased orchard trees and, at the same time, by removing chokecherries from the vicinity of the orchard.

Several other virus diseases occasionally affect cherries in eastern States, but as yet are not considered serious.

Fungus Diseases [4]

The most important fungus diseases of cherry are leaf spot [5] (fig. 22) of the foilage and brown rot [6] of the fruit.

Leaf spot

Leaf spot is caused by a fungus that overwinters on fallen leaves. In spring, spores are discharged from these leaves and carried by the wind to the new leaves on which they germinate and cause infection. Small spots, purplish at first but finally brown, develop on the leaves and produce enormous numbers of summer spores; these spread infection to adjacent leaves and trees.

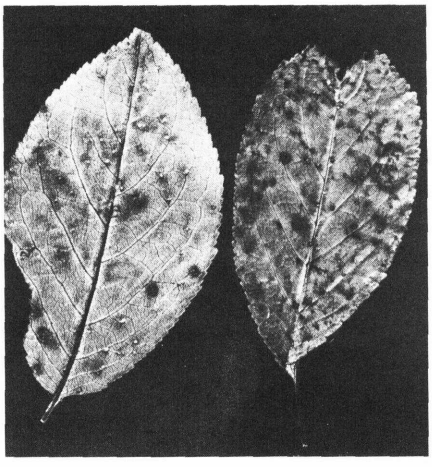
If not controlled, leaf spot will cause partial to complete defoliation. In mild cases, only a small number of leaves may be spotted, but frequently during periods of damp or rainy weather the spots become so numerous that the tree is completely defoliated before the crop is harvested (fig. 23).

Control of leaf spot on sour cherries requires at least five spray applications: (1) As soon as the petals have fallen, (2) when about three-fourths of the shucks have dropped, (3) about 10 days after the second spray, (4) 10 days to 2 weeks after the third spray, (5) immediately after harvest.

Fungicides.—Growers should consult their State agricultural colleges or county agricultural agents for information regarding the fungicides best suited to their localities.

Various sulfur or copper compounds have been used for many years to control cherry leaf spot. The sulfurs include liquid lime-sulfur, wettable sulfur, and flotation paste sulfur; the coppers include bordeaux, copper oxychloride, and tribasic copper sulfate.

These chemicals usually give satisfactory results, but occasionally



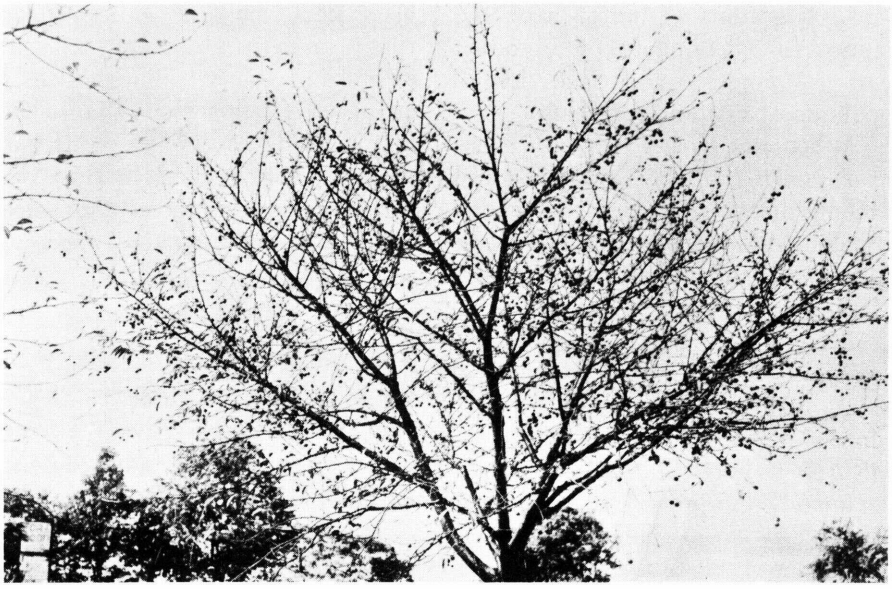
BN-11298-X

Figure 22.—Sour-cherry leaves affected with leaf spot.

[4] Prepared by H. L. Keil, plant pathologist, Crops Research Division, Agricultural Research Service.

[5] Caused by *Coccomyces hiemalis* Higgins.

[6] Caused by *Monilinia fructicola* Honey and *M. laxa* Honey.



DN–1972–X

Figure 23.—Montmorency cherry tree seriously defoliated by leaf spot.

they cause damage. Liquid lime-sulfur may discolor the fruit, and bordeaux may reduce the size of the cherries. Where such damage is likely to result, the less caustic forms of sulfur, and milder fixed copper (copper oxychloride or tribasic copper sulfate) may be used to hold the disease in check.

To spray sour cherries except the English Morello and Wragg varieties, lime-sulfur may be used, mixed at the rate of 1 to 2 gallons in each 100 gallons of water. Or bordeaux mixture may be used, mixed at the rate of 2 to 4 pounds of copper sulfate plus 4 to 8 pounds of hydrated lime in each 100 gallons of water. A third selection is the fixed copper, mixed at the rate of 3 pounds of material having 25-percent metallic copper content plus 3 pounds of hydrated lime in each 100 gallons of water.

Sweet cherries and the English Morello and Wragg varieties of sour cherries are sensitive to copper, and never should be treated with a copper compound. Lime-sulfur may be used, mixed at the rate of 1 gallon in every 100 gallons of water; it may be used in all five applications, but less injury will result if lime-sulfur is used in the first application and wettable or flotation sulfur (6 pounds in each 100 gallons of water) is used in the other four applications.

In recent years, the organic fungicides (captan, dodine, ferbam, and glyodin) have given outstandingly better results than the older type sprays of sulfur or copper. Therefore, much acreage is now sprayed with these materials. Formulations vary in different parts of the country. The quantities usually recommended for mixing

in 100 gallons of water are: 1½ pints to 1¼ quarts of glyodin; or, ½ pound of dodine; or, 2 pounds of captan or ferbam.

When antibiotics came into use for control of both animal and plant diseases, a material called cycloheximide was found to be successful in the control of cherry leaf spot. A water solution containing 1 to 2 parts of cycloheximide in each million parts is used. This antibiotic is sold commercially in tablet form; one tablet dissolved in 100 gallons of water makes a solution containing 1 part per million (1 p.p.m.) This material has a tendency to cause injury when used early in the season; it is not generally recommended for use on bearing trees before the cherries are at least ⅜ of an inch in diameter, a size usually attained 4 to 6 weeks after bloom.

Brown rot

A widespread and destructive fruit rot of peaches and plums is called brown rot; it frequently causes heavy losses to cherry growers during seasons when the skin of the fruit has been cracked by excessive rain or hail.

The first four spray applications made for control of leaf spot usually control the brown rot fungus. If the orchard has had previous outbreaks of brown rot, an additional spray application should be made just as the fruit begins to color. In this preharvest application, many growers prefer to use captan or wettable sulfur instead of either lime-sulfur or bordeaux mixture.

Other fungus diseases, such as black-knot,[7] powdery mildew,[8] leaf rust,[9] and scab,[10] occur to some extent on cherry. These diseases are usually less serious than either leaf spot or brown rot. Most of them are held in check by the applications of spray used to control leaf spot and brown rot.

INSECTS [11]

The insect pests most commonly found on cherry trees are the cherry aphid,[12] the plum curculio,[13] two kinds of fruit flies,[14] and the pear slug.[15]

Cherry Aphid

The cherry aphid is a tiny, black, shiny insect that curls the tender young foliage of the sweet cherry early in the season (fig. 24). Often, it severely checks growth. It rarely injures the sour cherry seriously.

The insects pass the winter as tiny, black eggs on twigs and small branches. These eggs hatch in spring about the time tree growth starts, and the young aphids cluster on opening buds.

Control.—The cherry aphid is most readily controlled by spraying the trees while they are still com-

---

[7] Caused by *Dibotryon morbosum.*

[8] Caused by *Podosphaera oxyacanthae.*

[9] Caused by *Tranzschelia prunispinosne.*

[10] Caused by *Cladosporium carpophilum.*

[11] Prepared by B. A. Porter, Entomology Research Division, Agricultural Research Service.

[12] *Myzus cerasi.*

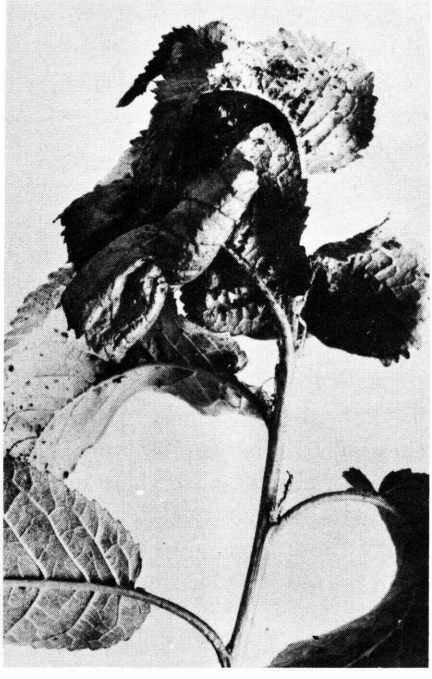
[13] *Conotrachelus nenuphar.*

[14] *Rhagoletis cingulata* and *R. Fausta.*

[15] *Caliroa cerasi.*

pletely dormant. The recommended sprays are (1) dinitrocersol, 1½ pounds 40-percent wettable powder or 1½ quarts of a 20-percent emulsifiable concentrate in each 100 gallons of water; or (2) dinitrobutylphenol, 1 quart 36-percent emulsifiable concentrate in each 100 gallons of water.

If the trees are not sprayed when they are dormant, control can be obtained by spraying them when aphids appear about the time buds are breaking, and again 10 to 14 days later. For these treatments, the recommended sprays are (1) nicotine sulfate (40-percent nicotine), ¾ pint in each 100 gallons of water or ¾ teaspoon in each gallon, to which is added enough soap to make the mixture soapy to the touch; or (2) malathion, parathion, or TEPP, used according to recommendations for dilution and caution in handling given on container labels.



BN-13427-X

Figure 24.—Cherry leaves curled by the cherry aphid.

It is of little value to spray later in the season because of the protection given the aphids by curled leaves.

Plum Curculio

The plum curculio is a small beetle that hibernates in trash in the orchard or near it. Early in spring, soon after the cherry trees bloom, the curculios move to the trees. Females insert their eggs just beneath the skin of the cherries; then they make crescent-shaped slits, each of which partly surrounds an egg puncture (fig. 25). The curculio larvae, or grubs, feed within the cherries for several weeks.

Control.—The curculio may be controlled by spraying the trees twice with lead arsenate, a white or pinkish powder. It is applied at a strength of 2 pounds in each 100 gallons of water (3 rounded teaspoons in each gallon), to which should be added twice as much fresh hydrated lime. The first application should be made 10 days to 2 weeks after petal fall, when the shucks are pushing from the newly formed fruit. The second application should be made 10 days to 2 weeks later. The lead arsenate may be combined with the fungicides used for disease control.

The plum curculio can be controlled also with two or three applications of parathion, EPN, methoxychlor, or dieldrin, diluted

and used in accordance with recommendations and cautions on container labels. Applications should be made at 8- to 10-day intervals, beginning at petal fall or shuck split.

Fruit Flies

In the Northern States, cherries are sometimes infested by the maggots of two species of fruitflies.

Control.—The adult flies can be killed before they lay their eggs by spraying with lead arsenate, as suggested for the plum curculio. The first application should be made early in June, and the spraying should be repeated once or twice during the succeeding 3 or 4 weeks, depending on the extent to which the chemical is removed by rain.

If spray residue is evident when the fruit is picked, it should be removed by thoroughly washing the cherries in a stream of water. The spray-residue problem may be avoided by spraying with finely ground cube or derris powder instead of lead arsenate. The powder should contain 4 to 5 percent of rotenone, and should be mixed at a strength of 2 to 3 pounds in each 100 gallons of water. Ground derris root should not be combined with a fungicide.

These fruitflies may be controlled also by spraying with malathion, methoxychlor, parathion, or Diazinon. Two or four applications should be made at 7- to 10-day intervals. Recommendations for diluting these materials and cautions in handling them are given on container labels and should be followed closely. The recommended intervals between time of last application and harvest should be observed; they are 14 days for lead arsenate or parathion, 10 days for Diazinon, 7 days for methoxychlor, and 3 days for malathion.

Pear Slug

The pear slug, also called the cherry slug, is a slimy, dark-colored worm that feeds on cherry leaves. The slugs appear on the trees in May or June, according to the locality; a second brood may appear in midsummer or late summer.

Control.—This pest is readily controlled by spraying the trees with lead arsenate, EPN, or parathion, as indicated for the plum curculio or the fruitflies.

DDT is also effective. It should be mixed as a 50-percent wettable powder, 2 pounds in each 100 gallons of water (2 tablespoons in each gallon), and should be applied 15 to 20 days after bloom. DDT should not be applied on cherries later than 30 days before harvest.

PRECAUTIONS

Insecticides are poisonous to man and animals. Handle them with care. Follow the directions and heed all precautions on container labels. Parathion, EPN, and TEPP are extremely poisonous; they should be applied only by a person familiar with their hazards and who will assume full responsibility for safe use and comply with all the precautions on the labels. Store insecticides in closed containers in a dry place, out of reach of children, pets, and irresponsible persons. Be sure they are clearly labled.

U. S. GOVERNMENT PRINTING OFFICE : 1962 O - 623366